The advantages of sulfur/graphene oxide materials

B. S. Imangalieva, A. A. Agisheva, A. Z. Bekeshev
K. Zhubanov Aktobe Regional State University, Research laboratory "Nanotechnologies", Aktobe, Kazakhstan, e-mail: nur_b_70@mail.ru

Elemental sulfur is a promising cathode material for lithium rechargeable battery, due to its high theoretical specific capacity of 1.672 mAh g^{-1} [1, 2]. Furthermore, due to the advantages of natural abundance, low cost and environmental friendliness, sulfur shows great potential as the cathode material for the next generation of highenergy rechargeable lithium batteries [3].

However, the lithium/sulfur system confronts some great challenges, prior to its widespread practical realization. Recently, great efforts have been devoted to improve the electrochemical performance of sulfur cathodes. Various carbonaceous and conductive polymer materials have been used to composite with sulfur [4–10]. The oxidized derivative of graphene, graphene oxide (GO), can be regarded as a functionalized graphene, bearing oxygen functional groups on its basal planes and edges, and, as it was found by Zhang et al., the functional groups on the GO surface play the role of immobilizers and can effectively confine any polysulfides from dissolving [7]. In the work we expect the formation of a highly porous structure consisting of sulfur with uniform graphene oxide coating on its surface at heat treatment at 150 °C to obtain the S/GO composite (Fig).

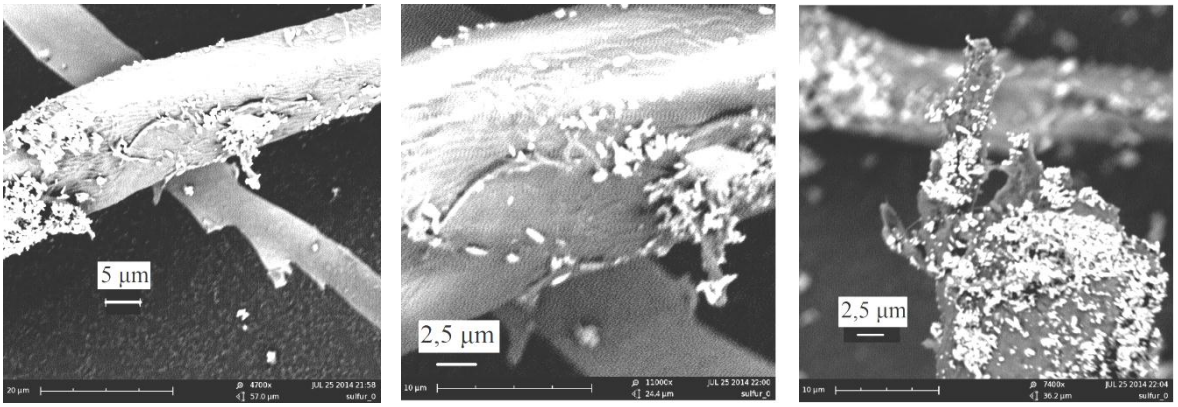

Fig. SEM images of morphology of the obtained S/GO mixture

References

1. Y. Zhao, Y. Zhang, D. Gosselink et al. Membrans. 2 (2012) 553.
2. Y. Zhang, Y. Zhao, Zh. Bakenov. Ionics (2014) DOI 10.1007/s11581-014-1165-5.
3. Y. Zhang, Y. Zhao, A. Yermukhambetova et al. J. Mater. Chem. A 1 (2013) 295.
4. Y. Zhao, Y. Zhang, Z. Bakenov, P. Chen. Solid State Ionics 234 (2013) 40.
5. Y. Zhang, Y. Zhao, A. Konarov et al. J. Nanopart. Res. 15 (2013) 2007.
6. Y. Zhang, Y. Zhao, A. Konarov. J. et al. Power Sources 241 (2013) 517.
7. L. Ji, M. Rao, H. Zheng et al. J. Am. Chem. Soc 133 (2011) 18522.
8. Y. Zhang, Z. Bakenov, Y. Zhao et al. J. Power Sources. 208 (2012) 1.
9. Y. Zhang, Y. Zhao, TNL. Doan et al. Solid State Ionics 238 (2013) 30.
10. Y. Zhang, Z. Bakenov, Y. Zhao et al. Ionics. 20 (2014) 803.